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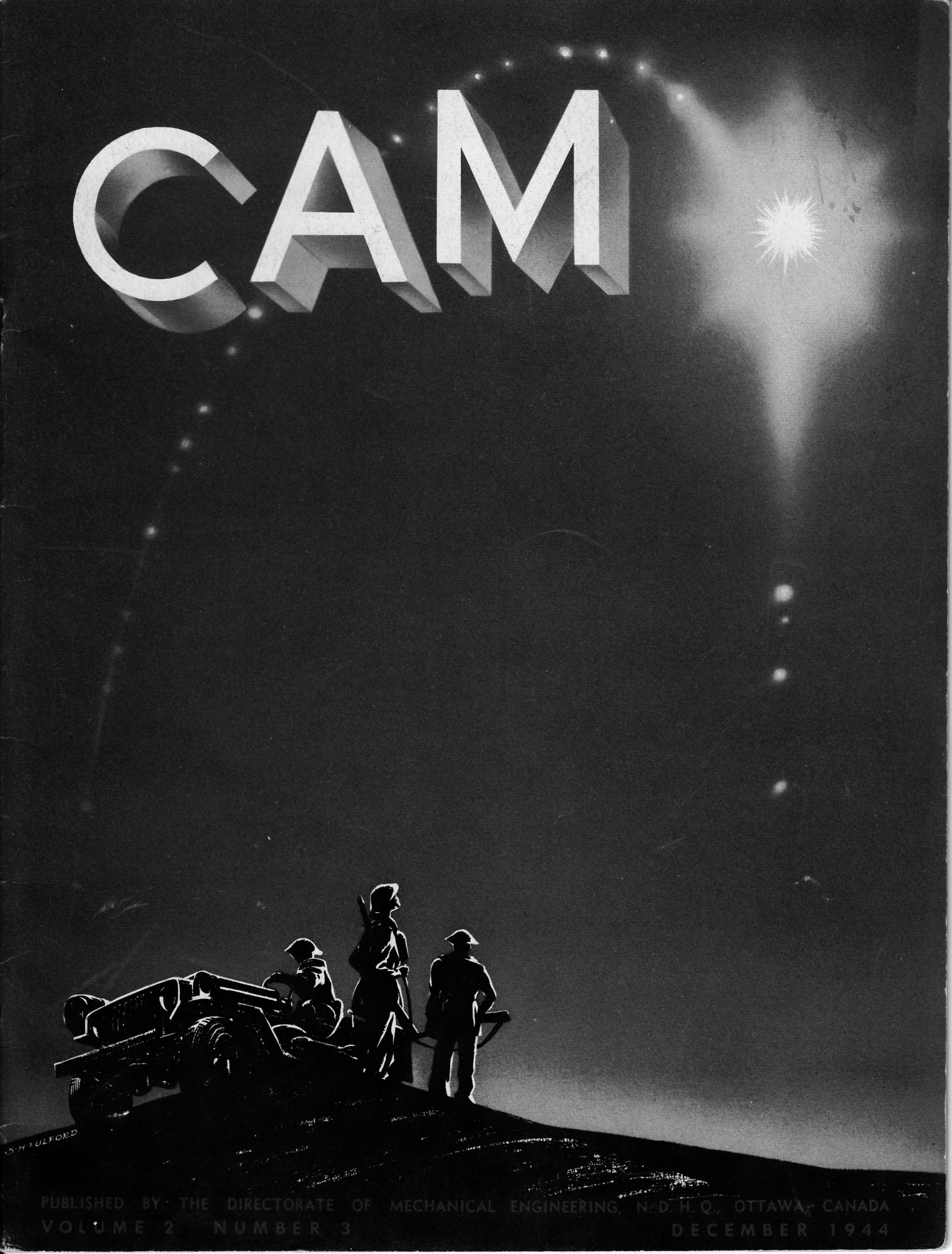

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OUR fifth Christmas at War—The horror of it all, the futility of it all if we fail in the final accomplishment to restore *"Peace on Earth and Goodwill toward Men"*.

To do this will tax our manpower resources to the limit, perhaps beyond, but let us take counsel from the theme of our cover—The Three Wise Men and the Star. No, it is not the Star of Bethlehem, it is only a Star shell bursting in the heavens, but there is a sign— the Sign of the Cross. The three men are not the original Wise Men—they are yours and mine, Father, Son or Brother, out there that we might be kept safe. Still, they are wise men for all that. If each and everyone of us does not do his part now, there will be no Peace on Earth or Goodwill toward any man.

Let us give thanks to Divine providence for those three wise men who have been spared to guide our destiny through these long years and let us mark well what they have told us— *"There is long and bitter fighting ahead"* —requiring supreme sacrifices in support of those who have gone before us.

Let us not fail **them**—who while spending this Christmas day in foxholes, trenches and dugouts, without the comfort of loved ones are at peace with their own conscience in that they did not fail **us.**

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Contents

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MORE distributor points

Last month we shot you the theory – this time it's the practical points covering the care of these babies.

WHEN it comes to renovating distributors there are ways and means. Only one way means operating efficiency and peak performance. The other ways mean comebacks, wasted fuel and parts.

Service distributors the **right** way and they'll pop a spark into the cylinders hot enough to ignite **all** the fuel. You'll find they'll last a lot longer too.

Returning from a visit to granma's the other day we managed to pick up a lift in the Colonel's staff car. (The driver was a beautiful blonde in Khaki and not an ounce over 120 pounds). Being allergic to engine trouble and blondes, we noticed right off that the Colonels' staff car was running like a one cylinder cement mixer. A few miles further on we wheeled into an army workshop. A quick diagnosis by the Sarge in charge brought to light that the trouble lay in the distributor.

The star of our story, (let's not get nosey), saunters up to the job—whips out a pocket flashlight and with one hand removes the badly blued and burned contact points. The expertness with which he handled his screwdriver and pliers indicated he was no novice and had probably worked on more distributors than there are hairs on a bear rug.

After carefully wiping the distributor cam lobes dry, he installed new points. Then, reaching into his hip pocket be produced a well battered and dirty feeler gauge. Wiping the blade of the feeler on the seat of his greasy coveralls he proceeded to make the gap adjustment.

This operation he accomplished in less time than it took our quiet but watchful driver to make a quick adjustment of her girdle. An entry in the log book "Overhaul Distributor" and we were on our way once more.

But this is not the end of our story. Thirty miles further down the road—the engine was hitting on five cylinders. Another mile and we were using four and then with a cough and sputter—it stopped dead.

With the aid of the driver's nail file and a thin dime (also borrowed from the driver)—we managed to clean and adjust the once more blued contact points. We also noted that besides being blue in colour—the point gap had closed up to about the thickness of the film of grease which our hero **had not left on the cam lobes.** Luckily—our temporary expedient enabled us to reach our destination and right then and there we decided to make known the difference between merely **installing contacts** and installing them so you **know** the distributor is going to stand up for more than a day or two.

We've met up with a lot of boys from the old school who seem to have the idea ignition systems on army vehicles are very little different from the type used on cars and trucks built in the early thirties. But there is a difference. In the days of low compression engines it wasn't important to have such a powerful spark at the spark plug. But as compression ratios and crankshaft speeds increased it became necessary to produce a stronger spark in less time. The spark had to keep up with the speed of the pistons. For this reason—modern ignition systems, like race horses, are sensitive. They have to be pampered with fine, accurate adjustments and be free from dirt, grease, gum, moisture and corrosion.

Giving it the works

To service the distributor **properly**

you have to remove it from the engine—even if it's just a matter of installing a set of contacts. Everytime the contact point spacing is changed you upset the spark timing sooo—you might just as well remove it from the vehicle in the first place. When it's on the bench you'll be able to see what you're doing and align the points etc. like they're supposed to be done.

Don't get us wrong—we're not laying down the law on how you should overhaul a distributor—just the shortcuts that will make the job easier and yet enable you to turn out a job that you'd want on your own car.

Visual Inspection

Even before you take the distributor off the vehicle you can start saving time. If the distributor cap is clean inside and out, not cracked and the segments aren't burned and no corrosion inside the high tension towers—leave it be. If you do find any of these things you'll have to unhook all the wires and take the cap off.

Before you yank the wires out of the cap, scratch a small "X" on the tower which is connected to number one cylinder. This will save you time when you replace them. The greenish corrosion that collects in the towers attacks the copper wire in the high tension cables and in some cases we've found the wire to be eaten away inside the insulation as much as an inch. Better check then to make sure this isn't the case on your jobs.

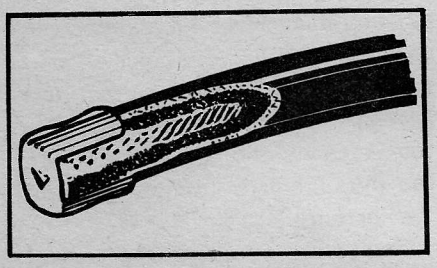


Fig. 1.—This is why the greenish oxide must be cleaned out of the high tension towers. If you find it in the towers always inspect the wire—it may be eaten away even though the insulation looks perfect.

If you see any signs of rust inside the distributor—make sure the ventilation holes in the cap aren't plugged.

Removing the Distributor

Here's another little trick that will save you time later on. Before you take the distributor off notice the position of the rotor. Imagine you're looking at a clock and note the direction the rotor is pointing—such as, two o'clock, three o'clock, six o'clock etc. If your memory is bad write it down—then when it comes time to reinstall the distributor you'll only have to move it a few degrees either way to time it—providing someone doesn't step on the starter while the distributor is off.

Look for trouble

When you have the distributor in the vise and before you pull it apart —check for bushing wear. Checking this first will save you the trouble of overhauling the whole unit— then finding you should have replaced the shaft or bushing.

The easiest way to check for bushing and shaft wear is turn the cam so the contact points are fully open. Now press on one side of the cam—tending to open the points still further. If there's excessive side play of the shaft and movement of the points when you do this it's a sure bet there's wear and you'll have to remove the shaft. As soon as you know whether the shaft has to be pulled or not you're ready to dismantle the distributor for cleaning.

Dirt

This is your first enemy—so you clean the distributor both inside and out. Dirt causes wear and interferes with the operation of the governor weights and contact points. If you remove the points, condenser, vacuum

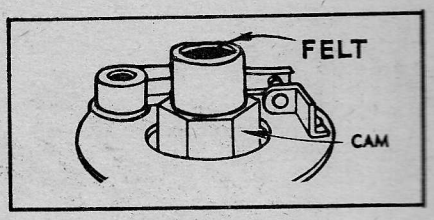


Fig. 2.—This little bit of felt is small, but important for proper lubrication. It's easy to lose—so watch it.

control and the plate which holds the contact points you'll have a much better chance of doing a good cleaning job. You'd better remove the small felt pad in the top of the cam before you start cleaning too (See Fig. 2)—otherwise you'll probably lose it. (You won't find this bit of felt on Ford distributors). Varsol is just the thing for cleaning distributors— with a little brushing you can make 'em look like new. After all the parts are washed—dry them off—use compressed air but don't blow into the vacuum control or the pressure might ruin the diaphragm. If you use Gunk or Bendix Cleaner or any other strong cleaning solution —keep the vacuum diaphragm out of it.

Oil

Over-lubrication of the distributor is a common cause of failure. It's too bad the guys who do the lubricating don't know this. Are you one of them by any chance? If you do a good cleaning job you'll remove all the old lubrication and when you put the distributor together it can be relubricated properly.

Wear

There's a lot of moving parts in the distributor and now that it's nice and clean you can see just what is worn and what isn't.

If there was excessive play in the shaft and you've removed it—now is the time to find out **where** the wear is. It might be a worn shaft or worn bushings or both. The only proper way to check the shaft is measure it's diameter with a mike. Any shaft having .001" wear or more will affect

the operation of the contact points. If there's **less** than 001" wear on the shaft—installing new bushings will probably eliminate most of the play.

Any other parts that show excessive wear—such as the cam lobes or governor mechanism should be replaced.

On Auto-Lite distributors like the ones used on Chrysler products—check the distributor plate ball bearing. If the bearing feels rough after it has been cleaned you'll have to replace the inner plate assembly which includes the bearing.

Electrical Troubles

Last, but by no means least, come the electrical checks. Some parts like the points, the insulation, the lead wires, rotor or distributor cap segments can be given a visual inspection. This calls for a knowing eye.

The contact points for example can tell you a long sad story if you know what to look for.

The condenser should be checked on a regulation condenser tester. Don't use a 110 volt A.C. test lamp as this won't tell you what you want to know. A condenser in good condition should have very little or no leakage, the proper capacity for the make of vehicle it's used on and no resistance in the lead wire or at the points where the tin foil strips are connected inside the condenser case. The army issue condenser tester tells you all these things. If you find a condenser with a damaged lead wire or badly dented case—it's best to replace it with a new one. If you haven't got a condenser tester you can go by the condition of the contact points—they usually tell you a pretty accurate story. We've unfolded this story in Fig. 3 and 4.

Assembling the distributor

Make sure the governor weights are free to move and the governor weight springs are in good condition —don't stretch them because they

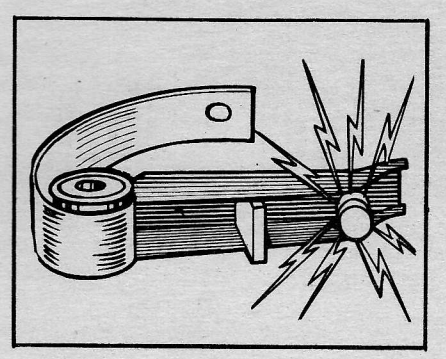


Fig. 3.—Here's the points to remember—

◆ *If the surface of the point is an even frosty grey—everything is hunky-dorey.*

◆ *If the surface is navy blue—likely there's high voltage in the system or a short circuit inside the coil. Check the amperage draw of the coil with the manual and check the generator voltage. Otherwise new points won't last long.*

◆ *If the points are black and have many small pits—the condenser is either leaking or has poor internal connections.*

◆ *If the point surface is black and oily it's probably due to over lubrication. Check the condenser though to make sure it isn't causing part of the trouble.*

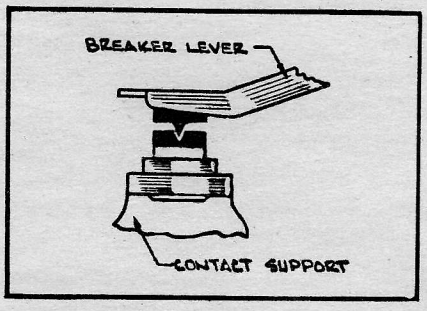


Fig. 4.—Contact point pitting is common and is usually caused by improper condenser capacity. The condenser must be balanced with the coil and driving speeds. The manufacturer specifies a condenser capacity to meet average driving conditions. Here's an easy rule to remember—"When the hole is in the Negative point the condenser has Not enough capacity". (Remember the N's). The negative point is the one connected to the negative terminal of the battery.

are calibrated springs. Put a few drops of light oil on the moving parts of the governor assembly before you install the distributor plate.

Check to see that the cam is free to move on the distributor shaft and is only held by the tension of the governor weight springs. Don't forget to install the little felt pad in the top of the cam that you carefully removed before the cleaning operation. A few drops of light oil on this bit of felt will keep the cam nice and free for a long time.

If it's the Chrysler type of distributor with a ball bearing breaker plate—make sure you pack the bearing, ½ full, with light grease (D.N.D. 672) before installing the plate.

Installing Points

Now comes the job which is one of the most frequent "jobs done wrong "on any vehicle. It's installing the contact points. Install the ground contact—there's nothing to that except remember to keep your fingers **off** the **contact surface.** Then —before installing the other contact, put just a whisper of light grease (D.N.D. Spec. No. 665) on the contact arm pivot pin. Don't over do it or the grease will run down on the points when the distributor gets warm. Done that — O.K. — still keeping your fingers off the surface of the contact points—install the contact arm. There's a special way of doing this. Hold the arm between your index finger and thumb compressing the contact spring **just enough** to slip the arm into place. If you compress the spring too much, you may break it—or lose some of the tension.

The spring tension of the contact arm is very important and is something that's usually taken for granted as being correct. The points are opened by the cam lobes but the only thing that closes them is the contact arm spring tension. This tension has to close 'em fast because

the points in an average six cylinder engine open and close about 120 times per second at fifty miles an hour. You can see why they can't waste time closing. If the spring tension is too strong the points may bounce, affecting coil operation and also causing excessive wear of the contact fibre rubbing block. Every work shop and unit garage is equipped with a spring tension gauge so now is the time to remove it from the moth balls and put it to work.

Contact arm spring tension can be decreased or increased by slightly bending the spring when the arm is removed from the distributor—be carefull when making this adjustment though—you can easily break the spring.

When checking the contact point spring tension the scale should be at right angles to the contact arm and as close to the point as possible. With the points closed—push them open with the scale. Read the tension just as the points separate. General Motors, Chrysler and Willys distributors require a spring tension from 18 to 20 ounces. Ford requires a little more tension—20 to 24 ounces. Fig 5 shows a spring tension scale in action, it also shows where to bend the contact spring to increase or decrease tension.

Aligning the contacts is very important.This is another operation that makes or breaks the distributor job. Any bending you need to do should be done to the stationary contact—there are exceptions of course and in some cases it may be necessary to bend the movable contact slightly. A special bending tool for this purpose is available but if you haven't got one go easy with the pliers. Whatever you do, don't grab the tungsten surface—it's brittle as glass and will crack about as easily. Fig. 6 shows why the points must be properly aligned.

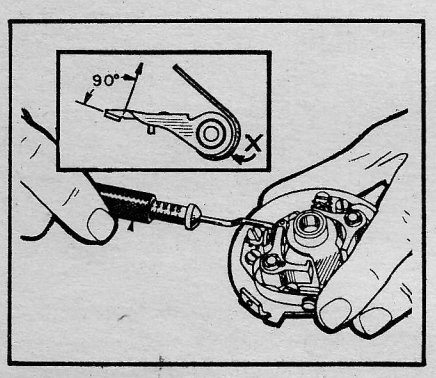


Fig. 5.—Installing contacts may change the spring tension. It's a life and death proposition—check 'em all—new or old. When you need to increase or decrease the tension 'X' marks the spot where you bend the spring.

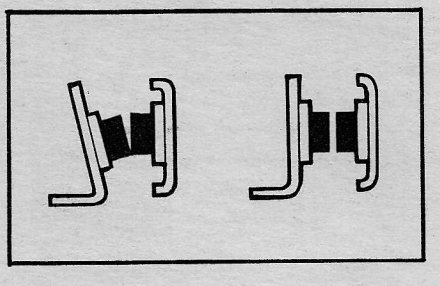


Fig. 6—The contacts are an electrical switch therefore they have to make a good contact. If they aren't aligned and only touch at one place it's just like a poor or dirty connection.

Adjusting Contacts

There are three ways to adjust the contact point spacing. By far the best way is by using a **cam angle gauge.** The next best method is to use a **dial gauge** which accurately measures the spacing in thousandths of an inch. The more common method and the most inaccurate is to use a feeler gauge. All workshops will be equipped with cam angle gauges before very long but in the meantime you'll have to do your best with the equipment you have. Be very careful when making this adjustment because efficient operation of the coil depends largely on the setting of the points. (*A complete story on point adjustment appeared in July issue of CAM—page 177. Ed.)*

Before installing the distributor on the vehicle make a final check for insulation leakage. You can make this test by connecting a 110 volt test lamp from the distributor terminal to ground with the points **open**. The test light should **not light**.

The last operation before the job is complete is to lubricate the cam with a thin film of cam grease (D.N.D. Spec. No. 665). Use it **sparingly** because too much grease on the lobes may work it s way to the surface of the contact point. Wipe off any excess grease which collects on the contact rubbing block. If you leave the cam dry the fibre rubbing block will wear down rapidly causing the spacing of the points to change. The grease cup on the distributor housing should be filled with fresh grease (D.N.D. Spec. No. 672) while the unit is off the vehicle —you probably washed most of the old grease out anyway during the cleaning operation.

Next install the rotor. Check to see it's not cracked and that the blade is not burned or corroded. The rotor blade and this goes for the segments in the cap, should **never** be filed and if it's .005" shorter than a new one it should be replaced. Any increased gap or resistance between the rotor and the distributor cap will cause the secondary voltage to rise in the coil. This in turn will cause the primary voltage to rise resulting in excessive arcing at the contact points and a shortened life for the condenser. (Wide spark plug gaps will have the same effect on the coil).

Well that's about all there is. Ford distributors require some work we couldn't mention here but in general the service is the same for all distributors.

Install the distributor and time it to the engine and you'll have done a job your Mother would be proud of.

x y z

CURE FOR SHIFTING TROUBLE *on tanks*

A pain in the arm to drivers are 3 short poppet springs in the transmission.

HAVE you been having a little too much trouble lately shifting gears on your S.P. Mounts and tanks (or other vehicles using the M4 transmission)?

Slide down to the right side of the transmission and locate the three little buttons (or retainers) shown in the pitcha and we'll tell you a story

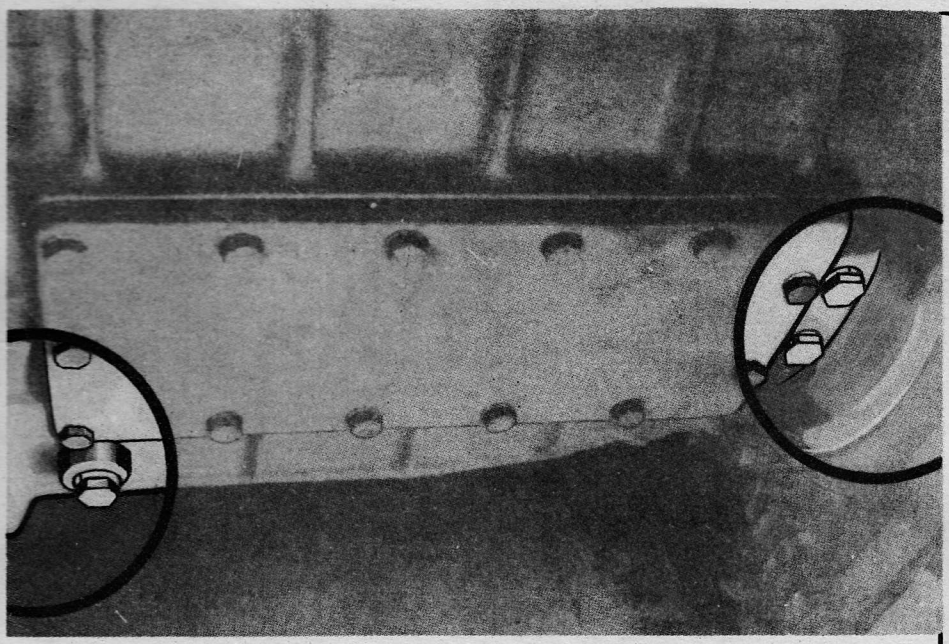
The story is that behind each of those three little retainers is a poppet spring and ball. When you shift gears, the spring forces the little ball into notches on the shift rods in your transmission. The ball in the notch on the rod guarantees that your transmission will stay put in whatever gear you've shifted into.

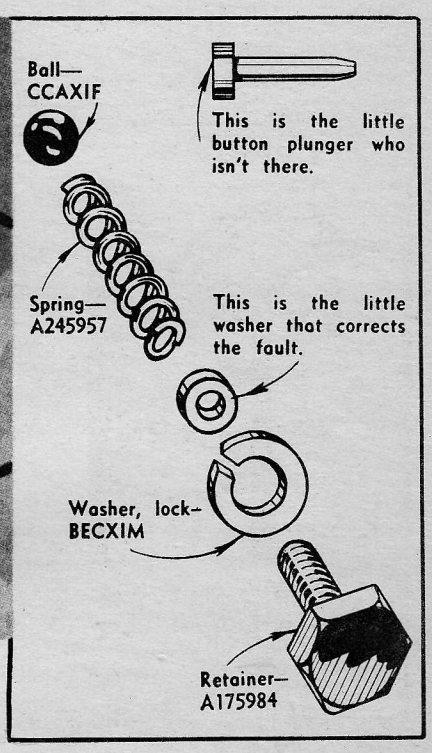
In the early days of the M4, the transmission contained behind each of these retainers (1) a shifter-rod poppet spring (Part No. A245957; free length 1-13/32", (2) a poppet-button plunger (Part No. A143782); and a steel ball (Part No. CCAXIF).

Later on however, somebody decided to do away with the poppet-button plunger. The result was that without the plunger, the spring did not have length and tension enough to hold the little ball in the notches on the shift rod. The result was less positive gear selection, a tendency to slip out of gear or, when you went to shift, the shifter rod would not go completely into neutral and the interlocks inside the transmission locked the other two shifter rods. Upstairs, you were saying all kinds of dirty words, but even with this you couldn't budge the shift levers.

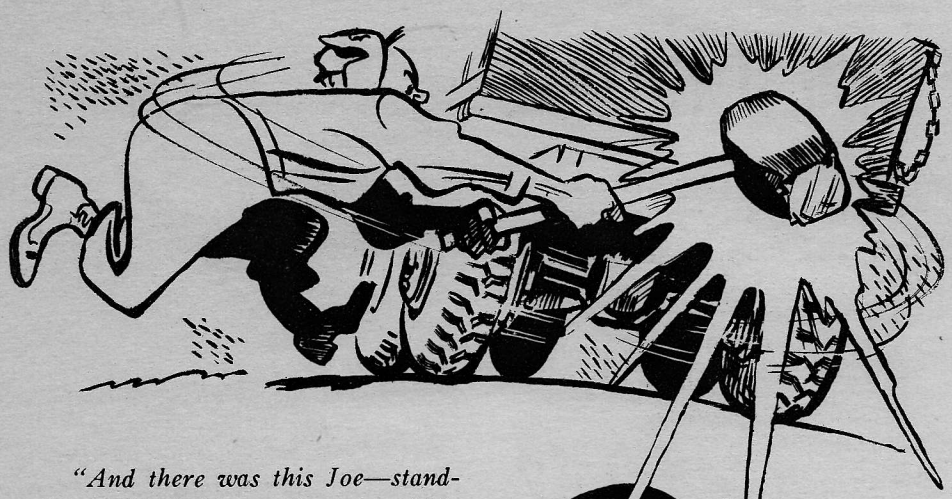
Now, however, comes C.A.L.E.M.E.I. (Tracked Vehicles J 014 Inst. No. 1) with a method of correction. Here's what it says to do.

When transmissions are inspected or overhauled, check the gear shift rod poppet springs for length. If the spring is not fitted with a button plunger it should measure 1 19/32" (free length). What you're more likely to find is no button plunger and a spring measuring 1 13/32" in length. **So** you install a 7/16" x 1/8" thick washer (or two 7/16" x 1/16" thick washers) behind the short spring as shown in the illustraton. This should clear up the tough shifting problem on your M4 transmission.





Behind each of these three retainers on the right-hand side of the M.4 series transmission is a poppet spring. Therein lies the tale of shifting woe on a lot of S.P. mounts and tanks.



PING!

"And there was this Joe—standing behind his stationary vehicle pounding at the back of it with a hundred pound sledge hammer . . ." —In answer to the polite query "why?" the answer was "I'm trying to move it!"

O.K.—so it didn't happen—nobody ever tried to move a vehicle like that—yet dozens—no, hundreds of drivers do literally the same thing every day of the week.

How? Ping—that's how. That little tinkling sound that you've heard from an engine as some lead-foot tramps the gas pedal down when pulling away from a standing start—or accelerating in high gear—signifies the same thing as using a 100 lb. sledge hammer to "hit" a truck into motion instead of apply a steady 100 lb. **push** with your shoulder.

What is this thing called Ping? To find that out, calls for a picture of what actually happens when the fuel mixture in the cylinder is compressed, ignited and burned.

All being well, the fuel mixture, compressed by the piston to about 1/6th its initial volume, is ignited by the spark. The spark actually only starts the fuel close to it burning. This flame grows—gradually spreading until all the fuel in the combustion chamber is burning. It isn't an instantaneous happening—but takes a definite period of time that doesn't vary—**regardless of engine speed.**

This compressed and burning fuel creates considerable heat, the heat in turn causing an expansion of these gases and it is this expansion which pushes the piston down on the power stroke. That's the point to remember. The gas should expand comparatively *slowly* and **push** the piston—not *instantaneously* so that it slams a haymaker at it.

It's when something causes this burning process to occur too rapidly we get this destructive yet innocent sounding ping.

Ping is referred to by a number of

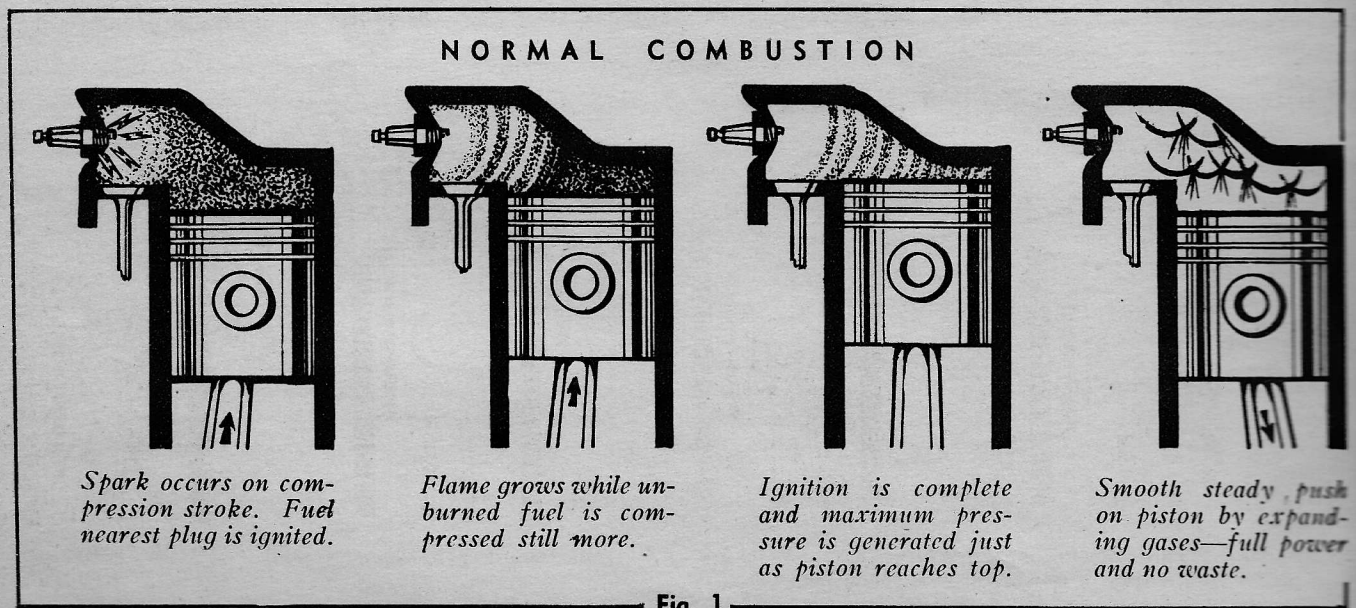


Fig. 1

Fig. 3. This piston was hammered to death by an aggravated case of ping.

different names such as "detonation, fuel knock, carbon knock, pre-ignition and spark knock"—all more or less descriptive of the cause of the trouble.

Take Detonation. Webster says detonation is an explosion with a loud report. That doesn't sound like a description of the ping-ping-ping you hear—but that's what it is. Under extreme pressure the fuel—instead of burning at its normal rate of combustion, virtually explodes like dynamite—only more violently. However, due to the mass of metal in the cylinder head and block and the water jacket, this is muffled down to a misleading little tap or a falsetto ping.

Don't let this lull you into a belief that no harm can come from such subdued sounds. Hellsapoppin with every ping—not to mention such less damaging but important matters as the wasting of gasoline and loss of power that goes on, for when the fuel "explodes" inside the cylinder it expands so rapidly that the connecting rod and crank shaft cannot absorb the power. It's the same story of moving a vehicle with a sledge hammer or a push.

Another thing—when detonation takes place instead of normal combustion, the temperatures in the combustion chamber go up—often triple. This extra heat can be enough to scorch a piston, or burn a valve head. In combination with the hammerlike pressure, the list of damage can include cracked connecting rod bearings, broken piston pin bosses, blown gaskets, split spark plug insulators, etc.

All this and loss of power too!

O.K. lets get back to the causes of this unwanted phenomenon.

There are a great many factors that might cause an engine to ping. Most likely on the list could be: *the fuel—spark timing—carbon—pre ignition and you.*

The fuel

Years ago engineers found that for every pound they compressed the fuel charge, they got back four pounds of combustion pressure. It didn't take them long to figure from there that to get more powerful engines they must increase the compression pressures. Right off they ran into a snag. There was a limit to the amount compression ratios could be increased before knock—or ping set in.

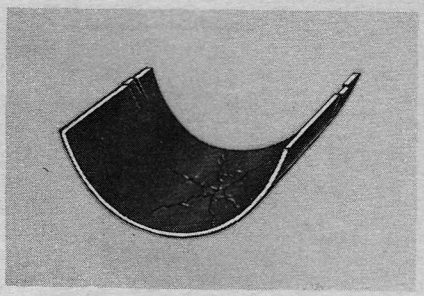
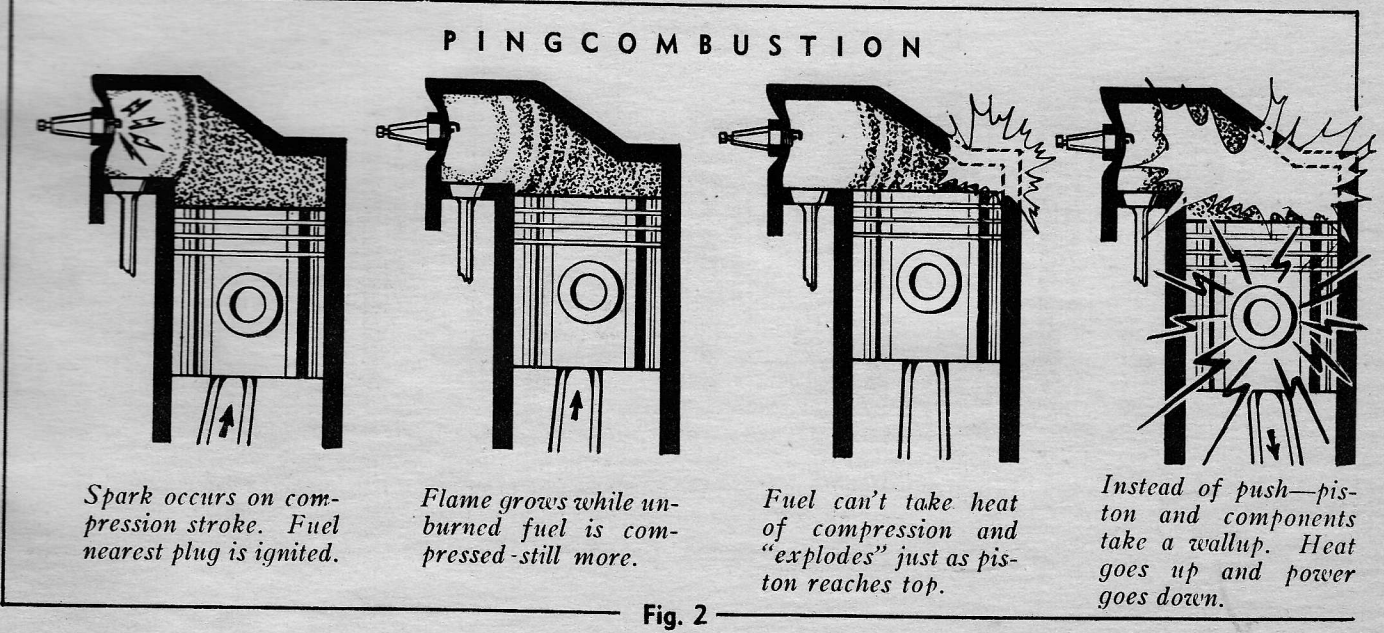


Fig. 4. Here's another result of one ping too many. This connecting rod bearing gave up the unequal battle and quit.

This was partially overcome by improving the cooling and developing combustion chamber design to increase turbulence — "swirling" the mixture to help get complete combustion. The rest of the job was left up to the anti-knock properties of the fuel—known as its octane rating. The higher the octane rating the better the fuel will stand high **temperatures** and **pressures** without ping.



Spark occurs on compression stroke. Fuel nearest plug is ignited.

Flame grows while unburned fuel is compressed still more.

Fuel can't take heat of compression and "explodes" just as piston reaches top.

Instead of push—piston and components take a wallup. Heat goes up and power goes down.

Fig. 2

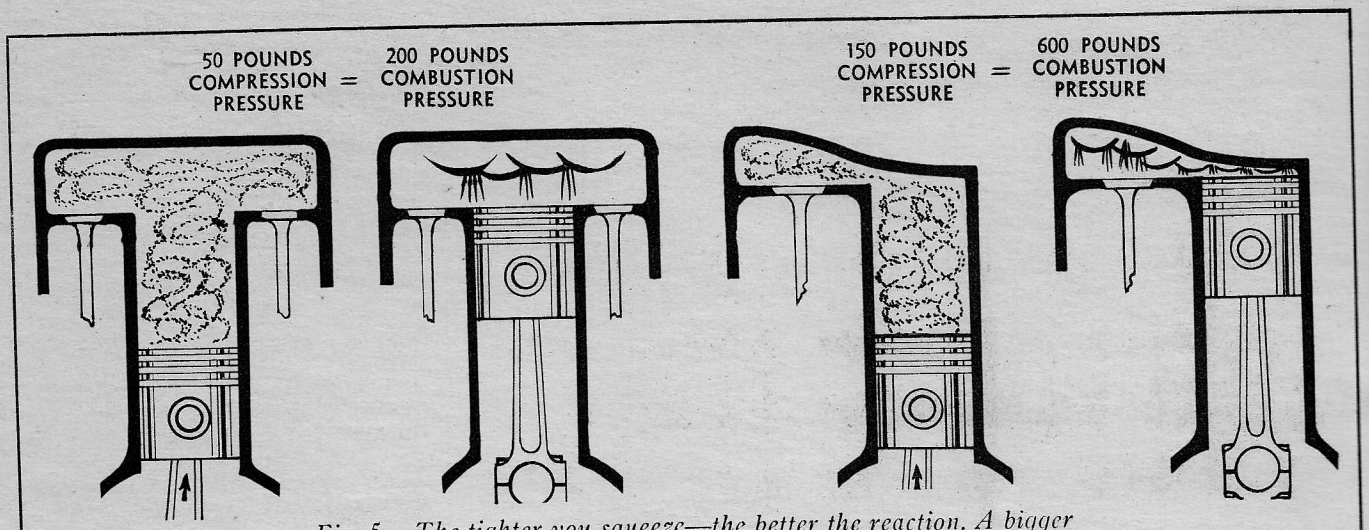


Fig. 5. The tighter you squeeze—the better the reaction. A bigger power pay-off from the same amount of fuel and the reason high compression was born.

In recent years compression ratios of engines have been stepped up with the aid of these advances in design and fuel. Instead of 4½ to 1, many of our vehicles now have over 6¼ to 1 compression ratios which has meant combustion pressures have increased from around 200 to 600 pounds per square inch at 1000 R.P.M.

Spark Timing

Firing the fuel, via the spark, is like swinging at a baseball. To bat that pill for a homer you start swinging the bat **before** the ball comes over the plate. In an engine the piston is the ball and the bat is the power stroke. Because the piston is moving fast, the spark has to start combustion **before** the piston reaches the top of the cylinder. This gives us complete ignition of the fuel by the time the piston reaches the top and the maximum pressure for the power stroke.

When the spark occurs too early the expansion of the burning gases plus the compression by the piston, raises the temperature of the fuel too high and part of the fuel explodes.

If the spark is too late the piston starts down before combustion gets fully under way with the result that power is lost and fuel wasted.

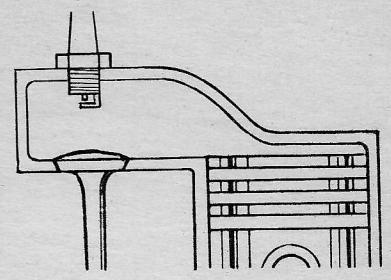


Fig. 6. The Ricardo head—designed to give the incoming fuel a swirling motion was a designer's contribution towards beating ping. The spark plug is situated close to the exhaust valve—normally the hottest spot in the combustion chamber.

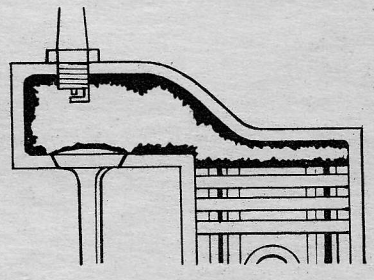


Fig. 7. The three carbon crimes—it keeps the heat in—it shoots compression too high—it forms incadescent particles in the combustion chamber. Any one of these crimes may cause detonation in the first degree.

Carbon.

Carbon causes ping in three ways. By forming a nice insulating blanket on the piston, valves and cylinder head, it increases the temperature of the combustion chamber. With a combustion chamber that's already very small a good coating of carbon makes it even smaller—jacks up the compression thereby raising the temperature still further. When carbon gets hot it is likely to burn like coal —(coal being mostly carbon). The particles of carbon inside the combustion chamber may be heated till they are white hot and this will ignite the incoming fuel ahead of the spark —pre-ignition it's known as. A combination of all or any of these things serve up a destructive ping.

Pre-ignition

Not always is carbon to blame for this unhappy event. The tip of a spark plug insulator—rough spots inside the cylinder head or the edge of a head gasket protruding inside the cylinder can get hot enough to become incandescent and beat the spark plug to the job of igniting the fuel. Sometimes these hot points will keep our engine running several seconds after you switch off the ignition.

That brings us to the last of our probable list of ping-causers . . .

You

Wait a minute now—we're not suggesting that you're incadescent, low octane or carboned up. We **are** suggesting what you can do about beating this rapping. The best part about it is that most of the P.M. is simply ordinary common sense—like making sure you install the correct heat range spark plugs and seeing that they are properly seated so that the heat can dissipate through the gasket to the cooling system. Sometimes a dirty gasket or loose spark plug can set up a ping in one cylinder.

The importance of cooling in this anti-ping campaign calls for clean and efficient cooling systems—particularly bad are hot spots in the block caused by accumulating rust and scale.

A lean fuel mixture may cause pinging because it burns hotter than normal. Correct jet sizes, clean passages and proper adjustments in the carburetor provide the cure.

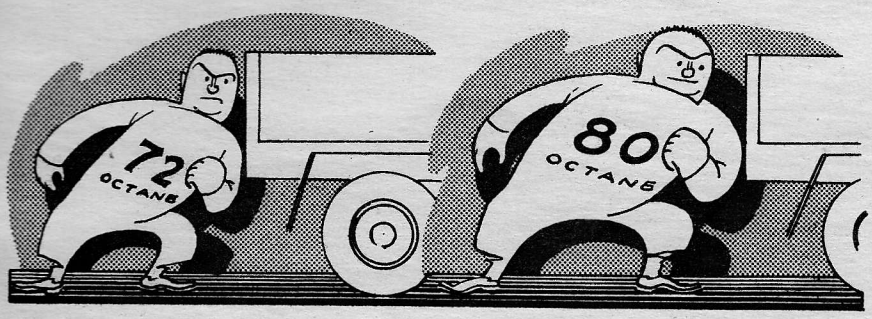
Since the advent of the new H.D. oils carbon has been a less pressing problem but still rates as a strong suspect. Even a comparatively thin coating pushes up engine temperatures which may cause pre-ignition. Scraping it off regularly is the only sure way out.

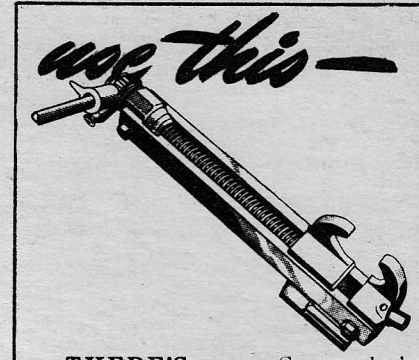
Manifold heat valves can contribute to a too hot condition if they stick—don't overlook them as a ping causer and see that they are free.

The effect of spark timing we've already covered—except to say it's probably the most common cause of ping of any of them. After the distributor has been adjusted in the shop to the manufacturers specifications, further adjustment must be made on the road. Advance the distributor a few degrees if necessary, until you can hear a **slight ping** when the engine is accelerated in high gear from 10 miles per hour. Then it's usually best to retard the spark timing just enough to stop any audible ping during acceleration or under load. Remember, you're a long way from the combustion chamber and when the engine is tuned for **maximum power** there's usually a slight ping, during acceleration that the driver can't hear.

You can't drive vehicles like you did four years ago. On the battle fronts rapid acceleration and full power is a life and death proposition —back home it isn't. In order that the boys over there get good gasoline we have to be content with a lower octane. In the past couple of months it was dropped to around the 72 mark. Your engine—which was designed for 80 octane fuel can't be expected to have the same zip and power on 72 octane. Seventy-two octane fuel was designed for the vehicles in the early 30's therefore you can't expect to get 1940 power out of it. If you try to get that power it'll ping—so it's squarely up to the driver and the weight of his foot. On tough up grades, get down to a lower gear a bit sooner and feed her the gas like you were stepping on eggs—not stamping on a rattlesnake. Baby that bus along—for a good driver doesn't sledgehammer his engine apart with ping.

X Y Z





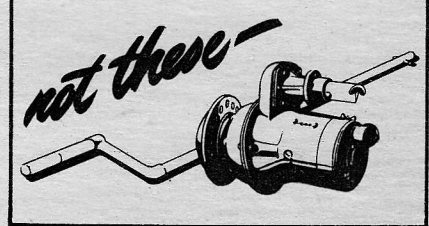
THERE'S many a Sarge who's developed a severe pain in the britches from warning his boys not to use the starter or hand crank when installing tank tracks. He has a reason for blowing his top over this and it's a good one.

When you use the power train to bring the end shoes of the track together you strain and damage the starter gear train. You also produce an angular deflection in the two piece crankshaft which shortens the life of the engine.

You don't have to indulge in this extremely bad habit—because your tank was blessed with proper tools for doing the job. Some tanks were equipped with a Simplex Jack and a pair of chains. Later models were equipped with the Simplex Jacks and a pair of hook fixtures instead of chains.

The latest type of Track Connecting Fixture, shown above, is standard equipment in some of the new tanks. These come in pairs and are the last word when it comes to installing or removing tracks. Regardless of which outfit you use, it's easier and safer than using the starter or hand crank.

If by any chance your tank hasn't got any one of these tools —don't lay hands on that hand crank or starter switch—do lay hands on a proper fixture with spare parts No. D-78191.



Know your enemy

THE sergeant had carefully neglected to point out the infamous history and the awful potentialities of the machines we boarded so blithely, but there were some among us who realized that here, inescapably, was The Mistake of The Canadian Army.

Introduced by the Fifth Column as part of the enemy's long range preparations years ago, this deadly device has been taking a grim toll, as many a tender Canadian—uh—derriere can testify. That they have a tiger by the tail, or at least a solo motorcycle by the rear mudguard, is recognized by the War Department and is the subject of endless harried forms (in triplicate, of course,) therefore, there is no exposé

This machine is fiendishly contrived—it is nothing less than a completely constructed group of booby traps.

Now, for instance, I am a habitual booby where these machines are concerned and therefore can be depended upon to disengage the clutch before kicking over the starter, thus rendering myself useless for the week-end. The opposite of this is to engage everything in sight, for safety's sake, including the gear. This will cause the back to rise several sudden feet when the starter is kicked but is more satisfying since the movement almost invariably includes biting deep into the headlight of the machine. Always good for a laugh and a spot of exercise is to neglect to turn on the gas. This will, in time, render one leg much shorter than the rest.

Obviously foreseen by the enemy was the added hazard caused by the necessary clothing worn while riding the solo booby trap.

Primarily the object of the masses of clothing is to drive the wearer into giggling imbecility, especially if he is a late sleeper. Failing this, the sheepskin upon rubber pants upon coveralls over battledress over all the other woollen wonders will melt at least five pounds off the rider at each trip—a serious consideration if the MC course is a long one.

Another, often disastrous mental hazard attendant to the layer upon layer of clothing was cunningly foreseen by the enemy. The constant vibration of the bike when the engine has finally been persuaded to give has the effect of causing an insane desire such as one experiences after heavy drinking, which in view of the numbers and diversity of the clothing, is an impossibility. Hence the rubber pants, doubtless.

However, the sergeant is waiting.

Having started the machine, desperately, one is required to hold out an arm to signitfy that he is ready, muttering "Morituri te salutamus" to no one in particular. The sergeant waits interminably, until the last arm has dropped off, and turns about and gives the signal to charge.

At this signal the sergeant leaps onto his own machine, with which he seems to have some sort of psychic understanding, and begets himself away with haste—and with good reason. For simultaneously with the signal, fifty per cent. of the class immediately stall their motors while the other half shoot off in all directions or hang suspended in mid-air prettily as their machines leap forth.

Hurtling appropriately past the hospital, the class averts its eyes as survivors of preceding classes gaily wave casts and crutches from the windows. From the gate out it is every man for himself or for the ditch.

The first turn always reaps a fair harvest of riders. By a specially constructed and secret device (I have never been able to locate it, anyway) the enemy has made it possible to spin quickly about without disturbing the steering mechanism, and appear to be going where one should be coming, or vice versa. This will cause a ripple of amusement to run down the length of the convoy as one or another of the rear riders is bunted from your path. This is an old custom and as part of it the sergeant invariably turns a delicate shade of purple, although there is nothing (except one or two riders) laid down on the subject. The same result may be obtained by daft ap-

What is the Christmas season without a fairy story—a Scrouge's ghost —a touch of fantasia! Having printed the true facts of maintenance life all year—surely we might transgress into the realm of fancy at this time and print something utterly untrue. Here it is—a literary gem as it originally appeared in the Brockville O.T.C's B.M.A. Blitz. We regard it as high libel against one of our pet vehicles—but with a sense of fair play worthy of higher things we print the other side of the story—so that you, being a sound exponent of things mechanical, can laugh derisively and quietly to yourself secure in the knowledge of your personal mastery of the m'cycle. Not only that—we thought it rather funny.

plication of the brake, with the added attraction that it can be done on a straight stretch of road where normally it is expected only on corners.

In mud or snow another peculiarity of these secret weapons becomes sweatily apparent. The rear of the machines are cleverly made to sink deep into whatever the back wheel happens to be skidding on. This in turn cuts off the engine—how this is done is vague, but very apparent, and this particular piece of mechanism never fails. To re-start the engine under these circumstances is next to impossible and means nothing when accomplished, since the process repeats itself ad nauseum.

By some unknown means, possibly a form of Radar, the machine seems able to locate patches of ice or other slippery matter and on such occasions rider and ridee, as it were, will become extremely confused as to just exactly who is which.

Many of the riders of the soul searing solo have been driven to the point of driving their machines casually into the nearest snowdrift and trying to appear as though they had never seen a motorcycle before. This is always belied by their clothing, especially the helmet.

The helmet's chief purpose is not, as one might naturally suppose, to ward off clouts upon the head or to deaden the volume of the sergeants' berating but is a scientifically calculated medium by which the rider's height is correctly adjusted to suit the bike. If the rider continually parts company with the MC it is thought to be an indication that he is too high for the bike and therefore top-heavy. Since he lands on his head at the completion of the movement, where he ordinarily would merely split his head open, he now finds his head driven deeper and deeper into his shoulders as the process proceeds which in time renders him less top-heavy.

The solo sadism is so built that at the slightest hint of unsteadiness by the rider the machine instantly siezes the bit between its teeth, as it were, and leaves very few courses open. Faced with this open revolt the rider can (a) be philosphical, (b) jump off quickly and steal away, pretending to be an uninterested pedestrian or (c) quickly draw a revolver and die happy.

According to the MC handbook the rider should endeavor to "ride the machine into the ground" upon finding himself at the point of disaster. This is very good advice, especially when travelling at high speed, for it saves the convoy the hardship of having to dig a grave.

When travelling at speed the rider will find that the steering apparatus means nothing—the machine becomes a single piece. Steering in this case must be done with the knees. It is considered definitely bad taste to comment in any way on the smell of burning knee joints as they come into contact with the hot cylinders.

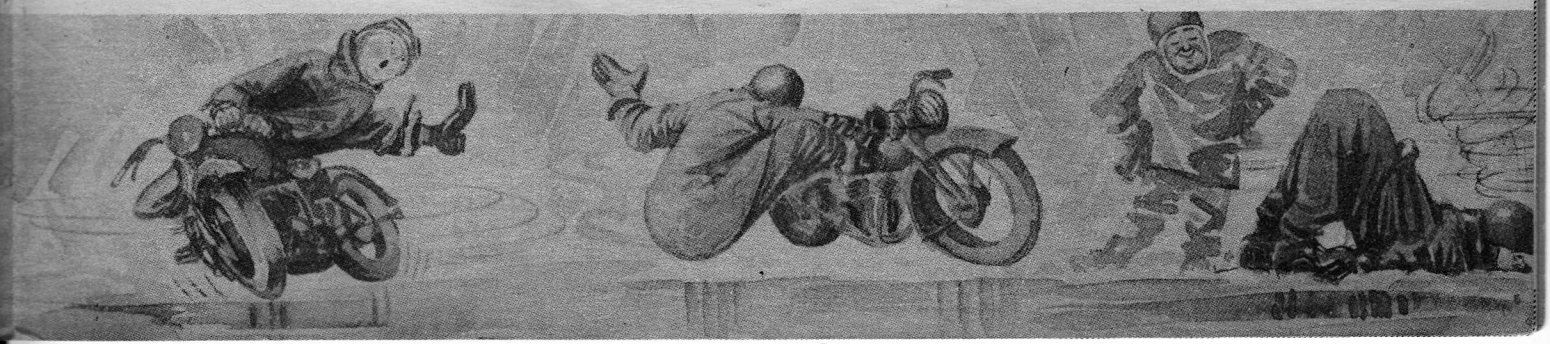
Marks will also be taken from the rider who continually knocks over trees, lightpoles or fences, although pedestrians and other riders (with the exception of the sergeant) are not counted.

In many places where snow or mud are encountered and the rider finds that the bike will not stay upright—it was made heavily with this in mind—the sergeant will exhort him to keep his feet on the footplates instead of endeavoring to stay out of the charnel house by the process known as "walking". His advise to keep the feet up is, of course, merely to provide further amusement for the sergeant and should be disregarded.

The squeamish motorbike rider will find convoy riding extremely hard on his nervous system, particularly if he happens to hold the rear place Not only must he disregard the numerous remains of various riders ahead, but following him relentlessly is what is known among the convoys as "the vulture". This is a large truck—the largest available—which haunts the convoy, scooping, blotting and scraping up those motorcycles which are no longer needed.

However, amid all the grim fun and games seen on motorcycle convoy, there are one or two bright points. One can easily (so very easily) miss subsequent weeks of hard toil by simply riding a MC for a short distance.

Besides, you ought to see the nursing sister who rubs my back every night. x y z



REPAIR OF *synthetic tubes*

It's a job for a R.C.E.M.E. tire maintenance man. If you're not that kind of a man—you can't provide the cure.

RIGHT now there are synthetic tubes in operation on vehicles in the field. With no immediate relief in the natural rubber situation in sight, it's a safe sound bet that there will be more and more coming into use in future.

At the moment these tubes coming your way are known as GR-S tubes—or Buna S type synthetic, and identified by a red stripe running around the inside circumference. Other synthetic types are identified by different coloured stripes but at the present time you'll only see red. So will the sarge if he catches you putting the fix on one of these tubes—**especially with a cold patch.**

A special vulcanizing job is the **only sure cure** for those striped tubes. You'll remember reading all about the temperamental nature of these tubes in the article on assembling them in the October issue. You learned that synthetic tubes can't take the same treatment as natural tubes. A lower tear resistance and flexing quality calls for special care.

So the thing to remember is—if the tube has a stripe it's a tire maintenance man's job to repair it because you haven't got the necessary paraphernalia to do the job right. Cold patching is taboo. Even on natural rubber, sometimes it works sometimes it doesn't. On synthetic tubes the odds are 99 to 1 that it doesn't.

In an extreme emergency, when you have no choice in the matter, you might *have* to cold-patch a synthetic tube. But just as soon as you possibly can—get that tube to an R.C.E.M.E. Workshop for proper repairs.

Without going into the whole detailed procedure which has been circulated to the tiremen—we'd like to underline a few of the most important and necessary items that can make or break the job. The official repair programme details the procedure for injuries over and under ½". For the smaller rips or partial injuries the inner reinforcements are eliminated, otherwise the story is the same.

Even if you're not a tire man—this might serve to point out the ticklishness of this job and help you fight that urge to do your own repairs.—(What urge? Ed.)

Most injuries to synthetic tubes will look like Fig. 1. You'll notice that they have a tendency to rip instead of puncturing in a nice round hole—and once the rip has started there is no telling where it'll stop. So check the tube for partial injuries in the rubber while you have it out and repair even the tiniest one. Else the minute your back is turned, those small injuries will tear themselves into another flat tire.

To stop this mad tearing, the ends

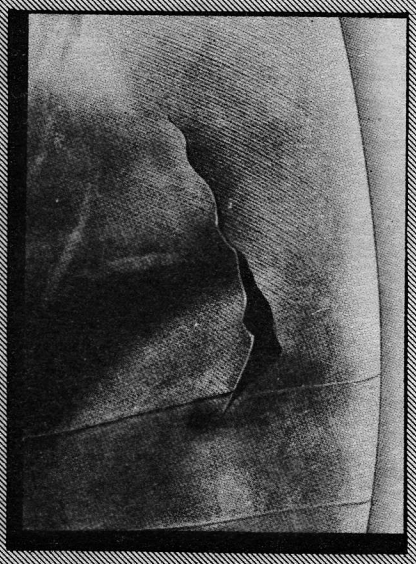


Fig. 1—There's the rip—and running *with* the grain. It's going to take special care to fix it.

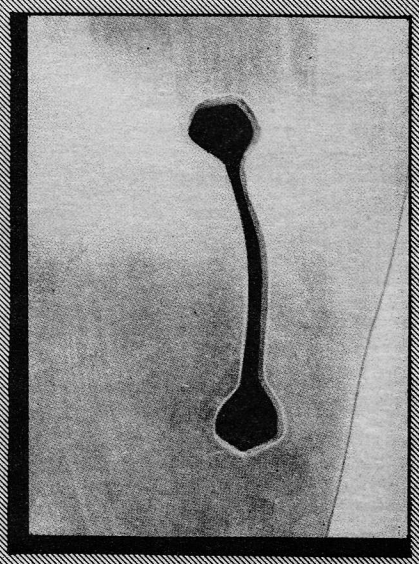


Fig. 2—Work of art in the fine art of dumbbelling.

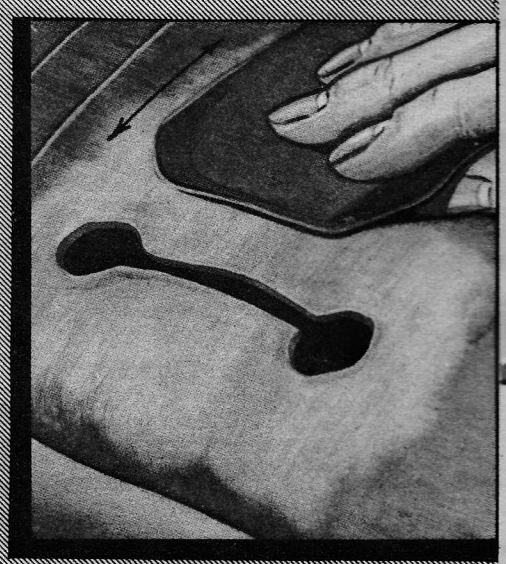


Fig. 3—Note that gentle touch that means so much—and working in the right direction—across the grain.

of the injury should be rounded out and the edges of the injury trimmed on a bevel so that the opening is not less than ¼" wide. Don't think this rounding procedure is a quirk of some artistic bewhiskered mind—it isn't. The injury will continue to tear even after it's patched **unless** you stop it with the tricky design—so let the dumbbell be the hole in the tube. Do your cutting along the lines shown in Fig. 2.

The buffing of synthetic tubes needs a tender and delicate touch. There'll be no wire brushes on this job—use a sander, sandpaper or emery cloth. Buff the surfaces thoroughly a good 1½ inches from all sides of the injury. The better the buffing job, the tighter the patch will cling.

It's important that this buffing job be done in a cross-section to the grain of the tube—**across** the grain and **not** in the same direction, as we point out in Fig. 3. That way you won't be taking a chance on tearing the injury further. And be careful—deep buff-marks, scrapes and scratches will start those partial injuries that rip like lightning and never slow down for breath.

Having got the injury ready for the operating table there remains the plastic surgery to be done that will make it good as new. Give it a wash, inside and out with "Isosol" (No. 1028) rubber solvent (being careful about open flames as this stuff is highly volatile and inflammable). Apply a coat of vulcanizing cement (90432) to the buffed areas, inside and out of the tube and also the edges of the opening. Using thin nosed pliers pick up a piece of cold patching material that is 1" larger in all directions than the injury, dip in solvent and insert through the tear, uncured side up as pictured in Fig. 4. Make sure here that no dirt gets on the uncured surface of the patch or on the cement area inside. Wiping the plier's nose in solvent before using will help here too. After the solvent has evaporated roll down all the edges with a stitcher.

The next step is to fill in the injury with *tube repair gum* (90239)—so that it will look like Fig. 5—smooth with no bubbles or spaces. You don't want to leave any part without enough gum to make the repair good and solid.

That takes care of the inner reinforcements, now you want a piece of tread repair gum (90240) large enough to extend ¾" beyond the injury in all directions. Two points to note here. You'll notice it says **tread** repair gum—not tube repair gum—and the reason is to provide a stiffer reinforced patch—one that comes as close as possible to having the same elasticity as the synthetic rubber tube, thus reducing undue flexing at this point.

The other point is the dimension ¾"—Here again we're trying to get away from harmful flexing that would be concentrated around the edges of the patch. Fig. 6 shows how, with the two different sized patches, flexing is avoided at *one* point.

The curing must follow the times, temperatures and pressures as tabulated in the instructions issued. Don't give the job a little extra pressure or a bit higher temperature—"to make sure" The lower temperature cure is the better of the two for synthetic tubes.

What we're trying to put over to the tire man is to follow the instructions carefully and watch the extra precautions if **you** want to end up with a good repair on a synthetic tube. At the same time we hope that you other guys will see the futility of your trying to throw an ordinary cold patch onto one of these synthetic tubes. Here's one touchy job we're asking you not to soil your lilly-white hands over—and that shouldn't make you mad.

x y z

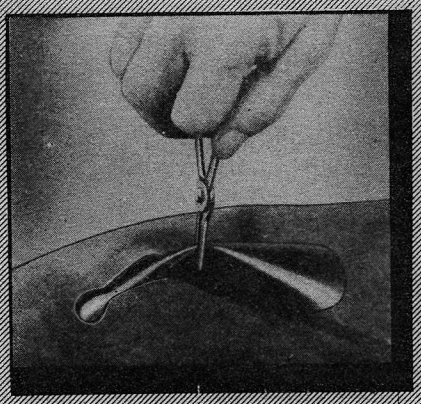


Fig. 4—The patch (1" larger than the injury in all directions) is picked up by the pliers in the centre of the uncured side and maneuvered thus.

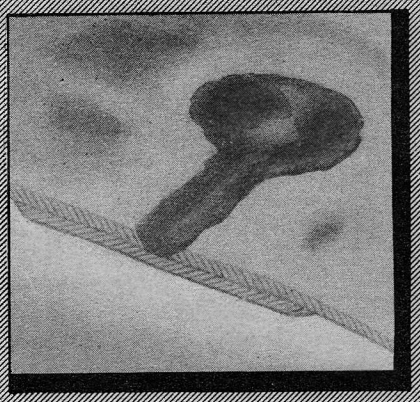


Fig. 5—After all that work, we've sliced through the middle of the job to get a cross section view of the tube repair gum nicely smoothed in the dumbbell. What we won't do next.

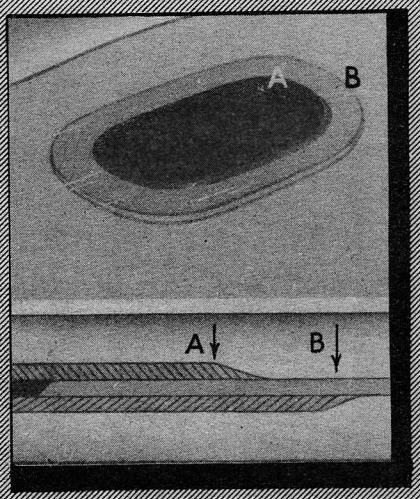


Fig. 6—X-ray shot—showing how the differently sized patches avoid putting the flexing strain at one point—instead, tapers it off over larger area from A to B.

Sgt. O'Sweat's HEADACHE & ASPIRIN Dept.

The time has come when you should meet,
A guy who's strictly on the beat.
Advice he gives to generals free,
Even takes the Padre on his knee.
With a blood hound's nose and air-cooled brain,
There is no answer he can't obtain.
So if you've a problem you can't solve,
On women — maintenance — why wheels won't revolve
Just drop a line to the gent above,
O'Sweat's the name—you know—care of

Cam Magazine, Directorate of Mechanical Engineering, Dept. of National Defence, Ottawa.

Installing Batteries

Dear Sgt. O'Sweat:

I've been told that when a battery is installed the negative terminal should be connected last.

Personally I can't see that it makes any difference which of the terminals are connected first or last.

Can you give me your opinion on this matter?

Pte. R.C.T

Dear Pte. R.C.T:

There's a very good reason for connecting the terminals of a battery in a definite sequence when installing a battery in a vehicle.

Someone gave you a bum steer though if they said to always connect up the negative terminal first.

The rule to remember is—**connect the ground terminal last**. The reason being, if you connect the ground terminal first it's quite easy to accidently short your battery pliers between ground and the ungrounded battery post when you're tightening the second terminal.

This has happened and in many cases has resulted in flying sparks from the accidental short. If the battery happens to be gassing the sparks might cause the hydrogen gas to ignite and explode in your face.

If a battery has just come off charge—either in the battery shop or in the vehicle it will likely be gassing.

When removing a battery you follow the same sequence—only backwards. Disconnect the grounded terminal **first.**

In some equipment the battery is positive ground, in other equipment the negative post is grounded—therefore you can see it's **wrong** to say "Always disconnect the negative terminal first".

O'Sweat

Broken Valve Springs

Dear O'Sweat:

In the August issue of CAM I saw some interesting tests made with a voltmeter.

Any additional information on the subject would be welcome.

In my work at the R.C.E.M.E. workshop I have noticed a lot of trouble with Willys valve springs breaking. If there is only one broken it is usually the one nearest the front. Can you give me any reason why this is the case?

Thanking you in advance.

Sgt. E.C.W.

Dear Sgt. E.C.W.:

You, and a whole lot of others seem to be interested in voltmeter tests according to our mail. Therefore we intend to whip up another article along the same lines pretty soon.

You aren't the only one who has run into valve spring breakage on Jeeps. There's a reason for it and there's something you can do to help the situation.

In most cases valve spring breakage is due to condensation and the formation of sludge in the valve chamber. The sludge is much more corrosive than ordinary water because traces of sulphur combine with the moisture to form sulphuric acid. This is extremely hard on valve springs. The reason the front valve spring goes first is because the sludge condition may be more prevalent in the front part of the engine.

At the present time the boys in N.D.H.Q. are seeing what can be done about supplying and installing a crankcase ventilator system on the jeeps now in service.

In the meantime it's up to the driver's and mech's to do all they can to prevent condensation and sludging conditions. (See October CAM, Vol. 2, number 1). Another thing you can do is install cadmium plated valve springs in the jeeps having the most trouble. Spare Parts now have a stock of these valve springs and they will resist corrosion much longer than the original springs.

One more thing to remember is to install the valve springs with the **open coils** toward the retainer and the end with the **closed coils** toward the block.

O'Sweat

Repolarizing Generators

Dear O'Sweat:

I have been reading the October issue of "CAM" and am interested in learning more on the subject of electricity.

What is the proper procedure of flashing the fields of a generator while the generator is either on a bench or on a vehicle? Also, can you give me the name of the best Automotive Electrical Manual and where and how to get it?

Thank you Sarge, hoping for a reply.

Sergeant V.R.T.

Dear Sgt. V.R.T.:

You've brought up a point that many a mechanic slips up on when making generator repairs.

The reason for "flashing the field" is to assure that the residual magnetism of the generator fields will be in the **right direction** so that it can charge the battery — that is — we want the polarity of the generator to jibe with the polarity of the battery. If the generator is operated when the field polarity is opposite to the battery, it not only won't charge the battery but will cause fluttering, arcing and burning of the cutout relay points.

To repolarize the fields when the generator is on the bench or on the vehicle it is necessary to flash battery current through the generator fields for a split second—thus "flashing" the fields. Remember, the current must flow in the **same direction** through the fields as it will **when operating** on the vehicle.

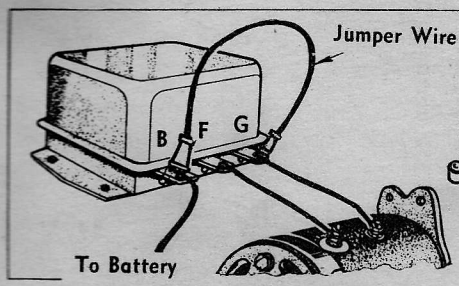
It's a sound idea to "flash the field" whenever the wires have been removed from the generator or regulator, before it is put into operation.

There are still a few grizzle pussed circuit sleuths who like to polarize the generator by closing the relay points by hand. On present day high output generators this trick can pay off in considerable damage. The internal resistance of high-output generators is very low and flashing the fields in this way, with the generator not running, cracks a very high current through—with the likely result of welding the points together and the prospect of the whole generator going up in smoke.

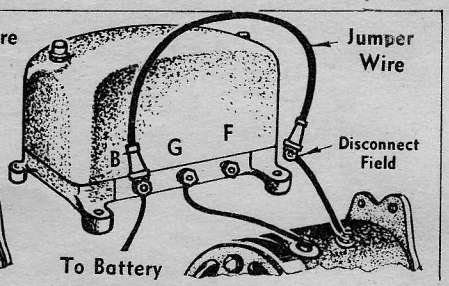
Here's the easy, safe and correct way. Short out the relay on the regulator for an instant, with the engine stopped, as shown in the pictures.

As to electrical manuals—there are several good ones. Here's your best bet—pay a visit to the Camp Educational Officer and get his advice on what is available in the Camp library and through the Canadian Legion Educational Services. On top of that, we plunk for Wm. H. Crouse's "Automotive Electrical Equipment" which sells for around two bucks in the bookstores.

O'Sweat



This is how it's done on all standard duty regulators with tin covers. Just touch a jumper wire between battery and generator terminals for an instant.



A little different story on heavy duty regulators with cast covers—(like jeeps). Touch jumper between battery terminal and the disconnected field wire for an instant.

Ford Resistance Units

Dear Sgt. O'Sweat:

I've run across a few Fords that are hard to start—especially when they are hot. By connecting the two terminals of the coil resistance unit together—thus shortening out the resistance, the engine will usually start easily.

Does this mean that the resistance unit is defective or do some Ford engines operate better without it?

Pte. I.L.Y.

Dear Pte. I.L.Y.

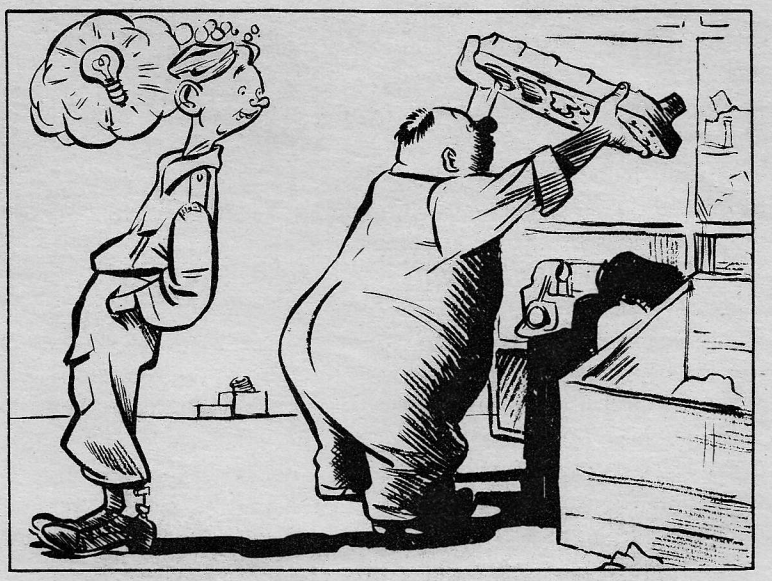
Oh—oh—something will be cookin for sure if you short out this resistance unit. That something will be the coil and contact points.

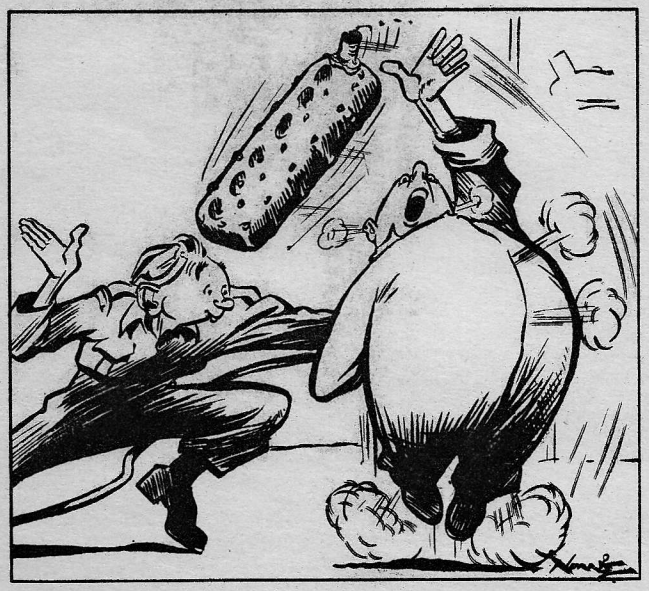
Very seldom will you ever find

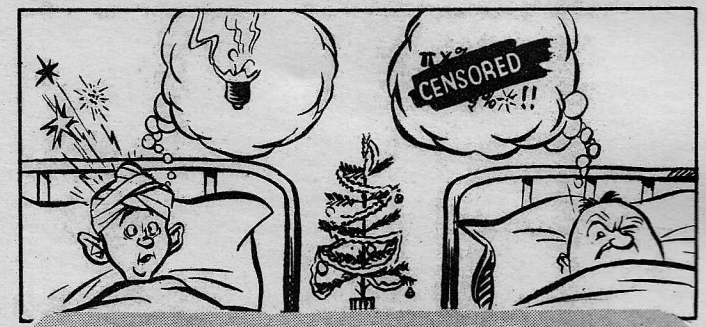
(Continued on page 58)

The CAM-PAINS of "BENNY BOOB"

Time on your hands Benny? What price a spot of horseplay? Just for a laugh y'know - brighten the place up. Nothing like a good practical joke to . . . .







What – no laughs? And the doc says Joe is injured rather seriously! Don't get us wrong – we're the last people to say you should go around with a sour puss all day – but horsing about with air guns in a shop where there's already enough tools and machinery to cause plenty of trouble is not funny.

NO LAUGH IS WORTH A PERMANENT INJURY.

Contributions

Do you know how to make maintenance easier? We're asking you. Maybe you've got a better way of doing a job—perhaps a new trick for your trade.

If so, write CAM and let the rest of the boys in the field in on it.

Rumble Tool Box for Jeeps

WHEN the Willys ¼ ton 4 x 4 is delivered from the factory it is accompanied by a set of tools and certain spare parts packed in a wooden box. The only place to carry these items is on the floor of the jeep —or in the driver's lap. As both spots involve the possibility of loss and inconvenience these tools are usually placed in Q.M. Stores. Sometimes this is O.K. In certain instances however it is necessary to carry special tools and equipment with you, and the question is where to put them.

The answer is under the back seat.

According to Lieut. R. H. D. Todd down at Meaford, Ont. it's a simple matter to fix up a built-in tool box under this seat—the Lieut. is right too for it took about one man-hour to build a facsimile from his plans in the workshop here.

Here's what you need:

(A) 1 mild steel plate 36½" x 4½" x 3/16".

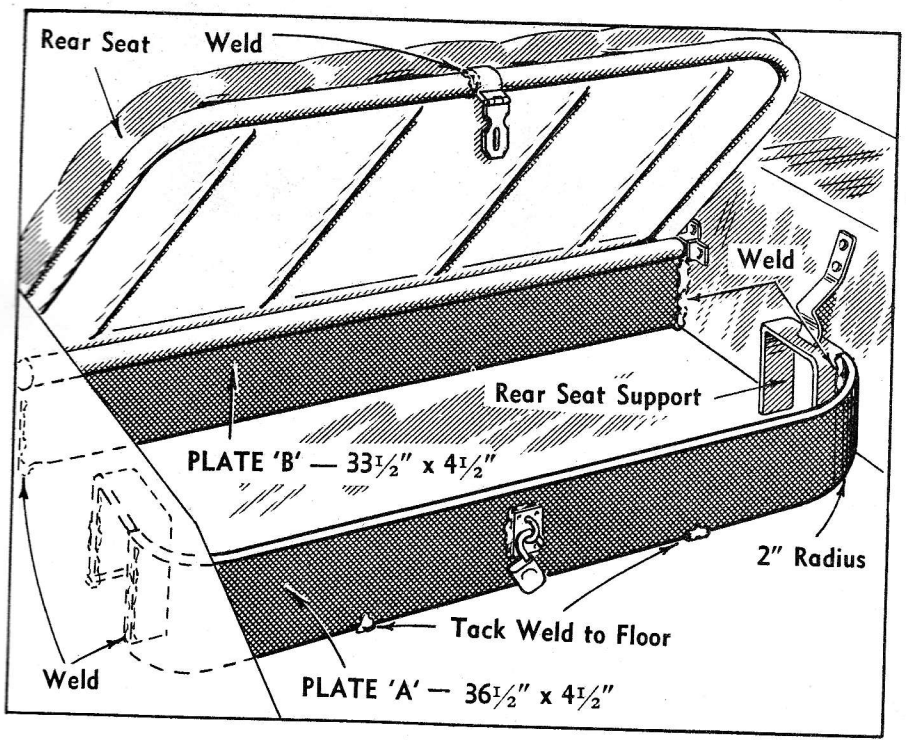
(B) 1 mild steel plate 33½" x 4½" x 3/16".

(C) 1 hasp and staple 3".

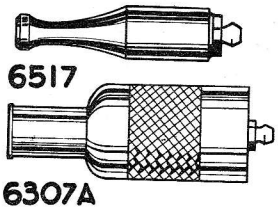
(D) 1 padlock.

The illustration shows how these are built into the rear of the jeep so that the back seat continues to lift on its hinge in the normal way and also forms a lockable lid for the compartment.

We suggest you give this rumble a tumble.



'U' Joint Lube Gun Adapter

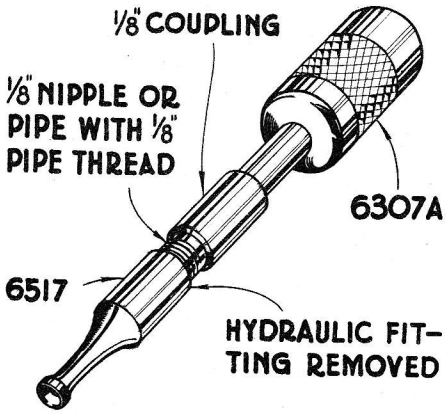


Once upon a time an adapter (6517) was supplied to lubricate the 'U' joints and other hard to get at spots on some vehicles. Then along came an improved version (6307A) with a sleeve to keep it from wobbling when used by mechanics equipped with only two hands.

Then along came the fact that lots of these adapters were becoming N.S. with a bad case of damaged needle in the nozzle.

Finally along came S.Q.M.S. Powell from the General Engineering Group, Ottawa, fingering a get-up like we show in Fig. 2 which he claims will put these N.S. adapters back into use in no time (daylight saving).

All you do is sweat a ⅛" pipe coupling onto the end of adapter 6307A. A ⅛" nipple will join the union to the 6517 adapter (with the hydraulic fitting removed). Fig. 2 shows the little double dandy adapter all ready to go to work on those 'U' joints. Both adapters are still available from stores.



O'SWEAT *(Continued from page 55)*

trouble in the resistance unit— more than likely it will be coil trouble. The remedy—a new coil.

The Ford coil is designed to operate with the resistance unit **in the circuit.** It limits the amount of current flowing through the coil to a safe value. Shorting the resistance out will increase the current—which may make a weak coil operate for awhile—but not for long. I've seen Ford coils after they've been operating for a day or so without the resistance. They look just like juniors all day sucker—late in the day.

The added current you send through the circuit will not only melt the coil but also will burn the contact points in the distributor

O'Sweat

Solid Ford Brakes

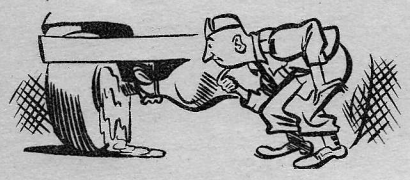
Dear O'Sweat:

Over a period of time in our shop we have run across several Ford 30 and 60 Cwt's that resist all our attempts to get solid brakes on them. This trouble only appears to be on the early models.

We have tried all remedies covered in the maintenance manuals and the early issue of CAM and even a few other things that have been suggested.

If you could help us out with this problem it would be a great help.

Sgt. R.E.S.



Dear Sgt. R.E.S.:

If your trouble was confined to one or two vehicles I'd be inclined to suspect the brake hoses. Cases have come up where the hose expanded slightly under pressure. Thus they absorb a large part of the braking effort instead of passing it along to

(Continued on page 60)

much ado about .22's

I HEAR much cursing and also bad language when I am visiting the indoor rifle range the other day. My sensitive nature is so shocked that I determine to carry out extensive investigation as to the "why" of the matter. I find that most of the abuse is directed at the head of a certain character, Cpl. Kizel, whose duties include the keeping of Small Arms in firing condition. And why?—Because half their .22" rifles are not working properly. This is very odd because these rifles are newer than the latest war maps. Since I am looking for a job anyway, I offer to examine the rifles to see why they will not function.

Now these rifles all turn out to be the new ".22 inch Long Branch", which are twin brothers to the No. 4 Service Rifles, except they are equipped with a .22" hole down the barrel instead of .303 inch. In the prescribed manner I load one of the rifles, aim and squeeze the trigger —result, one discouraging click. With another rifle I try the same thing and nearly climb out from under my hair when it unexpectedly goes off, after which I discover that the trouble with this particular one is it will not extract fired rounds correctly.

The rifle that will not fire is a very perplexing problem—until Kizel mentions that it was working all right before it was cleaned. Removing the bolt head reveals that someone had done the same previously, probably when cleaning the rifle, and dropped the firing pin out so that it has become lost. This can not be done with the No. 4 rifle because the firing pin is integral (that word I like) with the striker, but in the .22" job the firing pin is a separate item.

The rifle that will not extract got that way because the ammunition for these things comes with a protective lubricating coat of grease on it. This in due course worked up under the extractor along with a little dirt and the odd bit of sand so that the extractor will not reach far enough across the face of the bolt to grip the rim of the cartridge. Soaking the bolt head in varsol or kerosene will often loosen the grease and dirt from under the extractor.

I reach this point of my investigation before noticing a pile of unconscious bodies off to one side of the range and I ask Kizel where they come from.

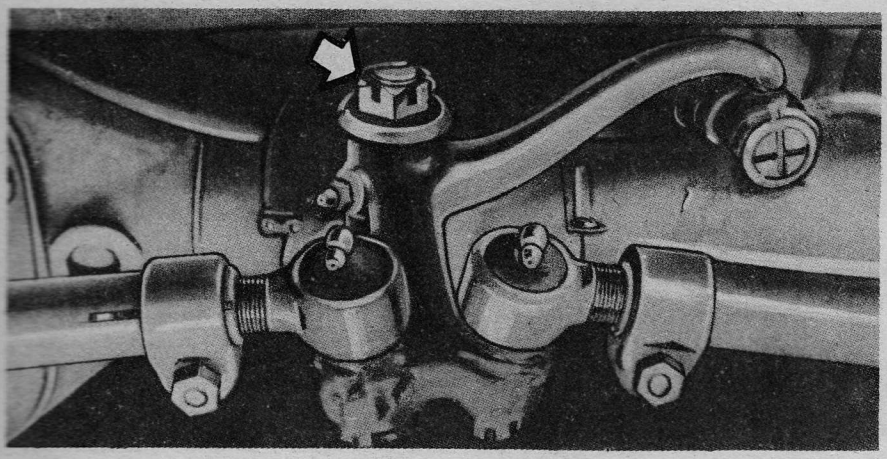
"Oh", he says, "they are Twiddlers", in a manner which indicates that this should be self explanatory.

WATER AND BELL-CRANK BEARINGS *don't mix*

HOW many ¼-ton jeep bell-crank bearing failures has your outfit had?

This odd little assembly sitting up front of the jeep with its chin out (see Fig.) is on the dirty end of the ride. If there's any water at all on the road, the bell crank picks it up. Water is the biggest cause of trouble —it gets into the bell-crank bearing, mixes with the grease in there, turns the grease to mayonnaise thus cheating the bearing out of its lubrication, and ruining the bearing.

Not only will a ride through a ditch or a puddle splash water into the bearing, but an ordinary washing with a water hose will do it. Turn a hose on the bell crank for a minute or so and then try lubricating the bearings. Watch closely and you'll see water squeeze out of the bearing before the grease starts to show. This happens even with the unit full of grease at the time of washing.



If just washing a parked jeep allows water to creep into the bearing, imagine what a ride through a puddle does, with the assembly squirming around and sucking in water.

What can you do about it? Well, lots of people have been replacing their ruined bell-crank bearings with bronze bushings. But lots of other people don't care for this idea. Probably the best prescription is to consider the bell crank a touchy assembly and keep after it with a grease gun. Anytime your jeep has been operated through water, give it a taste of the grease gun. If the jeep is washed, grease it (which is sound procedure anyway). Even is somebody just spits on the bell crank, grease it.

Grease is cheap, bearings are expensive!

x y z

"Oh", I say, "Twiddlers"?

"Yes", he says, "Twiddlers".

"What", I say, "are Twiddlers?"

"Oh", he says, "Twiddlers are those people who, when they pick up a rifle, twiddle with the little knobs on the backsight so the character using the rifle has to re-zero it. The weapon training officer does not take kindly to Twiddlers so that is why the pile of bodies in the corner".

"Oh", I say, and go back to work.

The rest of the rifles all show the same trouble as the first two, which indicates that a little care to see that the firing pins are not lost when bolt heads are removed, and a little labour in proper cleaning of bolt heads should keep these rifles shooting smoothly.

Twiddlers should of course be dealt with severely, some form of punishment such as cutting off their hands or heads being recommended by a number of people I know. If these points are looked after—the Long Branch .22" rifle should give long accurate service.

As I am about to leave the range the W.T.O. buttonholes me and says as follows:

"Look—what can we do about the loss of the eyepiece from the rear-sights of these rifles? The eyepiece just screws into the doohickus which runs up and down the post and has nothing to retain it"

Removing my Handy-Dandy-Little-Gem-Ready-Reference-Library from my first field dressing pocket, I quickly thumb through to the appropriate page and quote; "Nothing can be done about the loss of these items except cautioning the user to check after every few shots to see that the eyepiece is tight".

As I am closing the book I notice a paragraph which states that cleaning before and after firing is just as important with small-bore equipment as it is with other "Small Arms" and that too many people do not give the .22" the care they deserve. I am still wondering if my decision to refrain from insulting the mentality of the W.T.O. by drawing this to his attention, was correct or not.

x y z

O'SWEAT

(Continued from page 58)

the wheel cylinders.

If by "not solid" you mean you're getting a spongy pedal it's possible there's still air in the lines. When you check for air in the system make sure you bleed the longest lines first and keep plenty of fluid in the master cylinder while you're doing the job.

If this doesn't eliminate your trouble I'd say the finger of old age is pointing at the brakes on your older vehicles. The thing to do then would be to experiment with **one** vehicle by giving it a major brake overhaul. Take a note of everything you adjust or replace and cast a critical eye on cylinders, pistons, rubber cups and valve. Anything that allows leaking of fluid past the pistons will give you trouble. Make sure the valve is in good condition and there's no leak in the lines. Check the brake shoe clearance and the level of the fluid in the master cylinder.

Just in case you've overlooked this little item you might check up on Service Information Bulletin D. 4 which was published in 1942. This bulletin tells you about wheel cylinder piston cup expanders. In some cases—particularly in cold weather—the rubber cups need expanders to keep them from leaking.

If you do a perfect job there's no reason at all why the brakes won't work as they should. When you finish you should know where the trouble lies in the other vehicles.

O'Sweat

Bum steer!

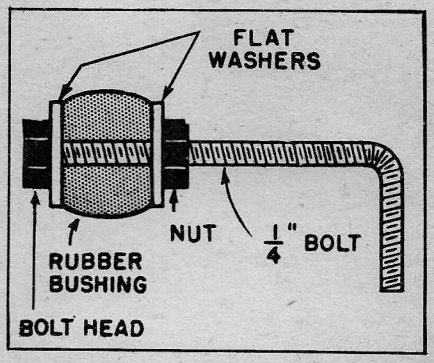
In last month's picture of the nifty wall control racks in M.D. 6 we miscredited the idea to R.C.E.M.E. Our apologies to the real M.D. 6 owners—A.23 C. & A.A.A. T.C.

Pipe Plug

WE were never very happy at the thought of using bits and pieces of rags to plug oil lines when overhauling engines to prevent dirt getting in and oil leaking out. There's been more than one engine damaged by buttoning up the job and leaving part or all of the cloth inside.

Here's an idea that came our way and you might like to use it on your Radial engines. You can make it in a jiffy and it's cheap and reliable.

All you'll need is an ordinary ¼ inch bolt 3 or 4 inches long, a ¼ inch nut, two ¼ inch flat washers and a length of electricians rubber tape. Make sure it's rubber tape, not friction tape.



Place one flat washer on the bolt flush against the head. Then you wrap the tape around the bolt next to the washer. Use just enough tape to make a rubber bushing equal in diameter to the inside diameter of the oil line. Next, place the second flat washer on the bolt so that it buts against the rubber bushing you have just made. Then install the nut. Complete the job by making a right angle bend in the bolt about one inch from it's end.

To use this contraption as a plug, slip it inside the oil line, bolt head first. Tightening up on the nut will expand the hand made rubber bushing making a good seal in the line. The right angle bend at the opposite end will act as a handle so you can hold the bolt while tightening the nut.

Two or three of these jigs in each tool box it will eliminate the necessity of using your good percales and lace hankies

x y z

Exhaust Elbows on Radials

NASTY reports from the field indicate there's been plenty of trouble with the exhaust elbows on your radial engines. It seems some of the boys aren't treating them right and they leak all over the place. This is not a case of **might** being **right**. Over-tightening will cause them to leak worse than ever.

The required torque tension of the nuts is 20 foot pounds, which isn't much compared to the tension used to tighten nuts on some other parts. Swinging on the wrench like you would on a track adjusting nut won't leave room for expansion. Both the elbow and the cylinder head are aluminum. When they get hot they expand sufficiently to make a tight seal. If they're overtightened they usually warp and leak. If you run across a leaky flange, check it for trueness with a straight edge, then file it true if necessary, removing as little metal as possible.

Another point to tuck under your tin hat is how to lock the studs. When a steel stud is screwed into threaded aluminum and is subjected to heat, the aluminum when hot will expand more than the stud, thus making a looser fit. Vibration takes care of the rest.

To stop the exhaust flange studs from loosening they have to be wired together. Merely using cotter pins won't do the trick. The nut will be locked on the studs but the studs will turn in the head.

Don't use cotter pins—use safety lock wire to lock the exhaust elbow nuts on Continental engines.

x y z

How's your 15 cwt. Throppletwaite?

Does your hack lack all modern conveniences? Eye this list and check the modifications needed to bring your Ford 15 cwt. up to scratch. She's not what she ought to be without them.

1. **STEERING END TO FRONT AXLE FLANGE BOLTS AND NUTS**
   Modification Bulletin E-1
   The 4 x 4's need longer, stronger flange bolts with lock washers replacing the cotter pins.

2. **STEERING GEAR ASSEMBLY**
   Modification Bulletin F-1
   A more rugged steering assembly for the earlier jobs. If yours has only three mounting holes in the base it's out of date—better count them.

3. **UNIVERSAL JOINT ASSEMBLY, FRONT AXLE**
   Modification Bulletin F-3
   Too much steering angle will play hob with the U-joints on the 4 x 4's. This modification will do the cure simply and add the feature of interchangeability with G.M.

4. **AXLE HOUSING RELIEF VALVE**
   Modification Bulletin G-2
   One-piece design axle housings had two way relief valves. They must be changed to the one way type so they'll let the air out and not let the dirt in.

5. **DRIVE PINION FLANGE DEFLECTOR**
   Modification Bulletin I-3
   This dirt deflector and oil seal protector is on all vehicles after serial No. 49942—they are needed on the earlier jobs too.

6. **ENGINE SERIAL NUMBER LOCATION**
   Modification Bulletin I-3
   Not that an engine is easy to mislay—but you can tell which belongs to who with the serial number on the block.

7. **TRANSMISSION GEAR SHIFTER FORK—REVERSE**
   Modification Bulletin J-2
   Cutting a chamfer on the shifter makes it easier for the driver to reverse 'er.

8. **TRANSMISSION COUNTERSHAFT GEAR THRUST WASHERS**
   Modification Bulletin J-3
   The 4 speed transmission cases have been taking a lot of wear and tear from the countershaft gear. The installation of thrust washers will beat this expensive business.

9. **RADIATOR AND CORE METAL BREAKAGE**
   Modification Bulletin L-1
   A couple of lugs are causing trouble with the core and sheet metal on the new style cabs—Pinning their ears back will fix it.

10. **GENERATOR REGULATOR MOUNTING**
    Modification Bulletin N-2
    The regulator doesn't like working upside down and becomes inefficient when asked to. If yours is hanging like a bat, switching it to the side panel is the cure.

11. **PAINTING OUT DECALOMANIA ON OIL FILTER CASE**
    Modfication Bulletin B-3
    The instructions on the oil filter tells you to change the filter element when the oil looks dark in colour. This isn't true with H.D. oil so you paint out the instructions.

12. **OIL LEVEL DIPSTICK**
    Modification Bulletin B-4 (replaced by) C.A.L.E.M.E.I. Wheeled Vehicles F-067, Instn. 1, Issue 1.
    To get a correct oil level reading on any Ford when the engine is hot you'll have to put a new mark on the dipstick.


A brief pose...
for
SEASON'S
GREETINGS